

Examining factor structure of Maslach burnout inventory among nurses in Taiwan

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Aim To investigate the factorial structure of a Chinese version of the MBI-HSS for nurses in Taiwan.

Background Previous studies have presented different factorial structures using the Maslach burnout inventory-human services survey (MBI-HSS).

Methods Secondary data analysis was implemented to explore the factor structure of MBI-HSS using exploratory factor analysis. Confirmatory factor analysis was then performed to verify the modified structure for nurses in Taiwan.

Results The EFA found that three factors explaining 57% of the variance were extracted, and 20 of the 22 items were retained. The goodness-of-fit test was performed using the CFA approach, and it was verified that the modified version of MBI-HSS is a suitable instrument for measuring burnout for nurses in Taiwan.

Conclusions A nationwide sample confirmed the factorial structure of MBI-HSS for nurses in Taiwan with a three-dimension, 20-item assessment, and the variance was not diminished in this sample.

Implications for nursing management These findings demonstrate that the modified version of MBI-HSS provides a suitable instrument for measuring burnout for nurses in Taiwan. Therefore, the modified version of MBI-HSS can be used to compare burnout of nurses across cultures, providing valuable information for policies or preventions in the future.

Keywords: burnout, confirmatory factor analysis, exploratory factor analysis, MBI-HSS, nurses, Taiwan

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Introduction

Burnout has been reported commonly among health care workers, especially in nurses (Spence Laschinger *et al.* 2009, Iglesias *et al.* 2010). In multiple studies, nurse burnout has been evaluated worldwide including America, Europe, Australia and Asia (Barrett & Yates 2002, Poncet *et al.* 2007, Lin *et al.* 2009, Dyrbye &

Shanafelt 2011). Barrett and Yates (2002) found over one-third of Australian nurses reported emotional exhaustion, and Li and Liu (2000) found that nearly 60% of 220 Chinese nurses showed a high degree of burnout. Previous findings demonstrated that nurse burnout can impact individual, organizational and patient care outcomes (Duffy *et al.* 2009, Hansen *et al.* 2009). Studies have found that burnout represents an

important factor to consider in the nursing shortage, the retention of nurses, job performance, stress-related health problems, and work satisfaction (Alacacioglu *et al.* 2009, Spence Laschinger *et al.* 2009, Jourdain & Chenevert 2010). Therefore, the identification of burnout in nurses is important to both prevent and manage emotional exhaustion. However, a suitable instrument needs to be established that can be used effectively to measure burnout present in nurses in different cultures.

Overview of the literature

Burnout is a metaphor to describe the experience of exhaustion resulting from long-term physical and psychological stress (Maslach 1982). The core elements of burnout include emotional exhaustion, depersonalization and a lack of personal accomplishment. Individuals with emotional exhaustion describe themselves as empty, and they lack the energy to give themselves to others (Maslach 1982). Depersonalization refers to a lack of interest that can lead nurses to regard patients as objects (Lin *et al.* 2009). Therefore, it is important to build a mechanism that can enable an individual to cope with emotional exhaustion fully (Duffy *et al.* 2009). In contrast, a lack of personal accomplishment refers to a negative self-perception, sense of failure and inadequacy in work-related situations (Kapucu *et al.* 2009).

The Maslach burnout inventory-human services survey (MBI-HSS) is the most widely used questionnaire to evaluate burnout, and has been applied to various healthcare providers including nurses, physicians and professionals, such as nurses from France (Poncet *et al.* 2007), healthcare staff from Sweden (Peterson *et al.* 2008), nurses from China (Lin *et al.* 2009), nurse anaesthetists from the Netherlands (Meeusen *et al.* 2010) and surgeons from America (Dyrbye & Shanafelt 2011). Several researchers have examined the cultural variations in factor structure associated with the MBI-HSS (Tang 1998, Beckstead 2002, Gil-Monte 2005, Kanste *et al.* 2006, Vanheule *et al.* 2007, Worley *et al.* 2008, Poghosyan *et al.* 2009). Worley *et al.* (2008) investigated 45 studies exploring the factors retained in the MBI-HSS, and found that only five were related to the professionals in healthcare settings. Most of these studies were conducted in English speaking countries, and were limited by a small sample size. However, Poghosyan *et al.* (2009) tested the factorial structure of the MBI-HSS using data collected from eight countries (i.e. United States, Canada, United Kingdom, Germany, New Zealand, Japan, Russia and Armenia). This study found that the 22 items displayed a similar factor

structure that can be applied to workplaces with only minor modifications. In Taiwan, only two studies have been conducted to measure nurse burnout using the MBI-HSS (Hsieh *et al.* 2004, 2008). Unfortunately, the factorial structure has not yet been examined due to various reasons including small sample sizes and space limitations. Therefore, the purpose of this study was to investigate whether the factor structure of a Chinese version of the MBI-HSS can be applied to Taiwanese nurses.

Methods

Introduction of the data source

A secondary analysis of data was conducted using the database from the NURSE-outcomes study, a nationwide study of nursing workload in relation to patient outcomes in Taiwan between 2008 and 2010. Data were collected in 2009 from nurses practising in four medical centres, nine regional hospitals and 35 district hospitals that were registered in the Taiwan Joint Commission on Hospital Accreditation. The facilities represented the Eastern, Western, Northern, Southern and Central regions of Taiwan. The data provided for this study were obtained from nurses ($n = 1846$) from 117 surgical and medical units who worked at surgical (41.9%), medical (50.9%) and general (7.2%) units. Nearly all of the subjects were female (99.6%) with a mean age 29 ± 5.3 years (ranging from 21 to 59) with < 2 years of nursing experience (70.1%) (Table 1).

Instrument

The MBI-HSS has been tested widely for reliability and validity (Beckstead 2002, Gil-Monte 2005, Vanheule *et al.* 2007, Poghosyan *et al.* 2009, Van Bogaert *et al.* 2010). In this assessment, nurses describe their degrees of burnout in a recent week on a 7-point scale (0, never; 6, every day). The three subscales of burnout include (1) nine items for emotional exhaustion (EE), (2) eight items for personal accomplishment (PA), and (3) five items for depersonalization (DP). The subscale total scores for EE, PA, and DP are 54, 48 and 30, respectively. According to Maslach *et al.* (1996), the degree of burnout is high if emotional exhaustion scores are ≥ 27 , depersonalization scores are ≥ 13 and personal accomplishment scores are ≤ 31 . The degree of burnout is moderate if emotional exhaustion scores range from 17 to 26, depersonalization scores range from 7 to 12, and personal accomplishment scores range from 38 to 32. The degree of burnout is low if the emotional exhaustion score is ≤ 16 , depersonalization score is ≤ 6 and

Table 1

Demographic characteristics of the participants

Characteristics	Total		EFA analysis		CFA analysis		P-value*
	n	%	n	%	n	%	
Type of hospitals							
Medical centre	624	33.8	328	34.6	296	33.0	0.23
Regional	548	29.7	265	27.9	283	31.5	
District	674	36.5	356	37.5	318	35.5	
Area of practice							
Surgical	771	41.9	384	40.5	387	43.3	0.36
Medical	938	50.9	498	52.5	440	49.2	
General	133	7.2	66	7.0	67	7.5	
Gender							
Male	8	0.4	4	0.4	4	0.5	1.0
Female	1814	99.6	931	99.6	883	99.5	
Marital status							
Not married	1372	74.69	714	75.40	658	73.93	0.68
Married	447	24.33	225	23.76	222	24.94	
Other	18	0.98	8	0.84	10	1.12	
Education							
Senior high school	16	0.87	7	0.74	9	1.01	0.40
College	923	50.44	471	50.00	452	50.90	
University	885	48.36	459	48.73	426	47.97	
Graduate school	6	0.33	5	0.53	1	0.11	
Nurse competence							
N	500	28.15	259	28.62	241	27.67	0.29
N1	578	32.55	290	32.04	288	33.07	
N2	512	28.83	273	30.17	239	27.44	
N3	150	8.45	69	7.62	81	9.30	
N4	36	2.03	14	1.55	22	2.53	
Hospital seniority							
<3 months	313	17.1	163	17.2	150	16.9	0.25
3 months–1 year	339	18.5	194	20.5	145	16.3	
1–2 years	633	34.5	311	32.9	322	36.2	
2–5 years	355	19.3	182	19.3	173	19.4	
5–10 years	133	7.2	66	7.0	67	7.5	
>10 years	62	3.4	29	3.1	33	3.7	

*Comparison of demographics between EFA and CFA groups. There was no significant difference between EFA and CFA groups regarding their demographics.

personal accomplishment score is ≥ 39 . The internal consistency reliability by Cronbach's alpha coefficient for the three subscales reported were 0.90 for EE, 0.71 for PA and 0.79 for DP, respectively.

The English version of the MBI-HSS was translated into Chinese using the forward and backward translation procedure suggested by Brislin (1970). One bilingual translator translated the MBI-HSS into Chinese, and a second bilingual translator independently completed their back translation. After the back translation, the Chinese version and the back translation version were examined for errors in meaning. For example, the meanings of 'burnout' and 'fatigue' are similar in Chinese, but these terms are different in English. Therefore, the wording of 'fatigue' was revised to 'burnout' in Chinese.

A pilot test of 50 nurses from diverse hospitals in Taiwan evaluated the translation adequacy of the translated version of MBI-HSS Chinese version. The

nurse volunteers answered the MBI-HSS inventory, and provided suggestions regarding the meaning of items, their clarity and their difficulty of understanding. The reliability of this pilot test was 0.85, 0.9, 0.88 and 0.68 for total, EE, PA and DP, respectively.

Ethical considerations of the study

Institutional review boards approved this study before the data were retrieved, and the data were encrypted for hospital and subject identification. For this study, the research team could only access the retrieved data. In the original database, each hospital independently granted the ethics committee approvals for data collection at their respective institutes. The subjects were invited from the participating hospitals, and informed consent was obtained before the data collection. After the data collection was completed, a gift (i.e. hand

sanitizer valued at \$200 NT) was offered to the participants.

Procedure

Psychometric testing of the MBI-HSS Chinese version included four processes. First, confirmatory factor analysis (CFA) tested the fit of the theoretical three-dimension structure. Second, item analysis was used to evaluate the relationship between items and their construct (Gorsuch 1997). Item analysis includes item difficulty and item discrimination, and was used to describe the item scores distribution related to subject responses. Therefore, the means and standard deviations of these items were used to delineate item difficulty. Item discrimination was used to determine whether the items could be used effectively to measure the differences among participants (Sim & Rasiah 2006). Critical ratio, item-total and item-subscale correlations were used to further delineate item discrimination (McGahee & Ball 2009, Wu 2009). The critical ratio was defined as the *t*-value when comparing the means between two groups, the upper 73% and the lower 27% of the sample (Sim & Rasiah 2006, Wu 2009). If the critical ratio exceeds the critical value of the *t* statistics, the item could effectively be discriminated (Wu 2009). The item-total and item-subscale correlations were used to examine the internal consistency, and this value should be > 0.15 (Polit & Beck 2005). Third, exploratory factor analysis (EFA) was used to re-structure the MBI-HSS based on item adequacy using item analysis. Finally, confirmatory factor analysis (CFA) was repeated to examine the fit of the modified structure.

The subjects were divided into two sub-samples using the random sample of cases function in Statistical Package for the Social Sciences 17 for Windows (SPSS/IBM Inc., Chicago, IL, USA). Exploratory factor analysis was applied to probe the underlying factor in one sample and to confirm the factor in the other sample. The Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett test of sphericity were applied to examine the adequacy of the sampling before the factorial analysis (Kanste *et al.* 2006, Vanheule *et al.* 2007).

The exploratory factor analysis (EFA) was applied to examine the new factorial structure from the data. The criteria for factor number retention was the following: (1) eigenvalues > 1 , (2) factor structure at least four items, (3) factor loadings above 0.4, and (4) no cross-factor loaded items (Hair *et al.* 2006, Kanste *et al.* 2006, Wu 2009). Principal component analysis with orthogonal rotation was used to execute the explor-

atory factor analysis for the MBI-HSS (Kanste *et al.* 2006). Orthogonal rotation assumes that factors are independent in a factor model (Wu 2009).

Confirmatory factor analysis (CFA) was performed on the second half of the sample to confirm the revised structure in Taiwanese nurses. The maximum likelihood estimation was used to confirm the structure of MBI-HSS. The model-data fit was evaluated by goodness-of-fit indices. The measures of fit criterion for an acceptable model included (1) a non-significant chi-square, (2) goodness-of-fit index ($GFI \geq 0.90$), (3) adjusted goodness-of-fit index ($AGFI \geq 0.80$), and (4) root mean square error of approximation ($RMSEA \leq 0.08$) (Li 2007, Vanheule *et al.* 2007).

Results

Of the 1846 nurses assessed in this study, 949 nurses were grouped for EFA, and 897 were grouped for CFA using random sampling of roughly 50% function in SPSS. After the modification of the MBI-HSS model, the average score was 28.57 ± 8.63 for emotional exhaustion (EE), 28.74 ± 7.37 for personal accomplishment (PA) and 7.26 ± 3.89 for depersonalization (DP). The demographic characteristics were not significantly different between the EFA and CFA groups. The theoretical structure proposed by Maslach (1982) was not appropriate for Taiwanese nurses using confirmatory factor analysis ($\chi^2 = 3997$, $P < 0.05$, d.f. = 206, $GFI = 0.8$, $AGFI = 0.76$, $RMSEA = 1$).

Item analysis

The results from item-analysis using MBI-HSS are shown in Table 2. Utilizing item analysis, the skew values were distributed from -0.41 to 0.63 , indicating the responses to each item were normally distributed (-1 to 1) (Hair *et al.* 2006). The critical ratios (*t* values) ranged from 12.83 to 31.43, and all items showed significant differences ($P < 0.01$), indicating a good discrimination among items (Wu 2009). The values of item-total correlations ranged from 0.31 to 0.65 ($P < 0.001$), and the values of item-subscale correlations ranged from 0.47 to 0.82 ($P < 0.001$), indicating all subscales were used to measure one concept. Therefore, all items were included for EFA.

Exploratory factor analysis

The MBI-HSS-Chinese Version consisted of 22 items. Hair *et al.* (2006) suggested ten subjects for each item was more acceptable for factor analysis (p. 112).

Table 2

Critical ratio, correlations, item mean (SD) and skew of Maslach burnout inventory-human services survey (MBI-HSS)

Item (item number)	Critical ratio (t values)*	Item-total correlation	Item-subscale correlation	Item mean	SD	Skew
Emotional exhaustion						
Emotionally drained (1)	28.20	0.58	0.79	40.16	10.30	-0.29
Used up (2)	26.19	0.57	0.79	40.31	10.31	-0.41
Fatigued (3)	31.43	0.64	0.82	40.06	10.38	-0.24
Strain with people (6)	31.29	0.64	0.74	30.03	10.47	0.09
Burned out (8)	31.32	0.65	0.81	30.71	10.43	-0.09
Frustrated (13)	27.10	0.61	0.70	20.85	10.32	0.27
Work too hard (14)	15.33	0.34	0.47	30.38	10.88	-0.22
Stress with patient (16)	27.91	0.59	0.68	20.77	10.43	0.24
End of rope (20)	27.86	0.61	0.79	30.69	10.44	-0.09
Personal accomplishment						
Understand patients (4)	10.67	0.31	0.67	40.03	10.20	0.19
Deals with problems effectively (7)	12.83	0.33	0.69	40.05	10.22	0.48
Influencing others (9)	14.25	0.39	0.71	30.73	10.33	0.26
Energetic (12)	21.15	0.53	0.63	20.61	10.38	-0.13
Create relaxed atmosphere (17)	16.57	0.43	0.75	30.51	10.32	0.16
Exhilarated with patients (18)	18.75	0.48	0.79	30.60	10.33	0.14
Accomplished worthwhile goals (19)	18.29	0.46	0.77	30.68	10.27	0.20
Deals with problems calmly (21)	14.0	0.38	0.70	30.53	10.29	0.16
Depersonalization						
Impersonal objects (5)	16.76	0.40	0.65	10.51	10.30	0.63
Callous toward people (10)	23.29	0.52	0.72	10.99	10.37	0.40
Hardened emotionally (11)	23.83	0.53	0.71	20.22	10.49	0.37
Does not care for patients (15)	19.46	0.46	0.66	10.54	10.25	0.55
Feel blame from patients (22)	17.20	0.41	0.55	20.14	10.37	0.36

*All items on critical ratio were significant (P -value < 0.01).

Therefore, the sample size ($n = 1846$) was adequate for EFA. The Kaiser-Meyer-Olkin measure of sampling adequacy of the MBI-HSS was 0.92, and the Bartlett test of sphericity was also suitable ($P < 0.001$), indicating the sample was suitable for exploratory factor analysis. The analysis produced a three-factor model, which accounted for 53.3% of the total variance. All items loaded on their original factors, while the factor loading of two items 'I feel I'm working too hard on my job' (item 14) and 'I feel patients blame me for some of their problems' (item 22) was < 0.4. After deleting item 14 and 22, the exploratory factor analysis was repeated resulting in three factors with eigenvalues > 1 and all items loaded on the same factors as the theoretical model (Table 3). These 20 items explained 57% variances.

Confirmatory factor analysis

The new structure model contained eight items for emotional exhaustion, eight items for personal accomplishment and four items for depersonalization. The result of confirmatory factor analysis showed an adequate fit between the three-factor with 20-item model structure and the data. The chi-square was 599.95 with degrees of freedom of 167, and the ratio of chi-square

to its degrees of freedom was 3.59, GFI = 0.92, AGFI = 0.90 and RMSEA = 0.05 (Figure 1).

Reliability and correlations among subscales

The reliability coefficients for the total, EE, PA, and DP were 0.85, 0.91, 0.86 and 0.65, respectively. The correlations for the EE and DP subscales, PA and DP subscales, and EE and PA subscales were 0.66, 0.38 and 0.29, respectively (Figure 1).

Discussion

The data used in this study were secondary data obtained from national data. Our study analysed a large sample size by using proportional stratified random sampling from five geographical areas of Taiwan (i.e. Eastern, Western, Southern, Northern and Central). A total of 1846 nurses were assessed who worked at surgical, medical and general units of hospitals. To measure the level of burnout in each respective population, item analyses as well as exploratory and confirmatory factor analyses were used to examine the reliability and validity of the Chinese version of MBI-HSS. The Chinese version of MBI-HSS includes

Table 3

The communality and factor loadings on structure matrix after re-structure BMI-HSS

		Original structure			Modified structure				
			Component				Component		
Factor	Item (item number)	Communalities	1	2	3	Communalities	1	2	3
EE	Emotionally drained (1)	0.67	0.80			0.68	0.81		
	Used up (2)	0.71	0.83			0.72	0.84		
	Fatigued (3)	0.73	0.85			0.73	0.86		
	Strain with people (6)	0.53	0.66			0.53	0.66		
	Burned out (8)	0.68	0.81			0.68	0.82		
	Frustrated (13)	0.50	0.67			0.50	0.67		
	Stress with patient (16)	0.47	0.62			0.46	0.63		
	End of rope (20)	0.66	0.80			0.66	0.81		
	Work too hard (14)	0.15	0.38			–	–		
PA	Understand patients (4)	0.50		0.68		0.50		0.68	
	Deals with problems effectively (7)	0.47		0.68		0.47		0.68	
	Influencing other (9)	0.52		0.72		0.52		0.72	
	Energetic (12)	0.49		0.62		0.50		0.62	
	Create relaxed atmosphere (17)	0.57		0.75		0.57		0.75	
	Exhilarated with patients (18)	0.65		0.80		0.65		0.80	
	Accomplished worthwhile goals (19)	0.62		0.77		0.62		0.77	
	Deals with problems calmly (21)	0.50		0.70		0.50		0.70	
DP	Impersonal objects (5)	0.56			0.74	0.56			0.74
	Callous toward people (10)	0.54			0.69	0.55			0.70
	Hardened emotionally (11)	0.51			0.65	0.52			0.66
	Does not care for patients (15)	0.52			0.70	0.53			0.70
	Feel blame from patients (22)	0.20			0.35	–			–

EE, emotional exhaustion; PA, personal accomplishment; DP, depersonalization.

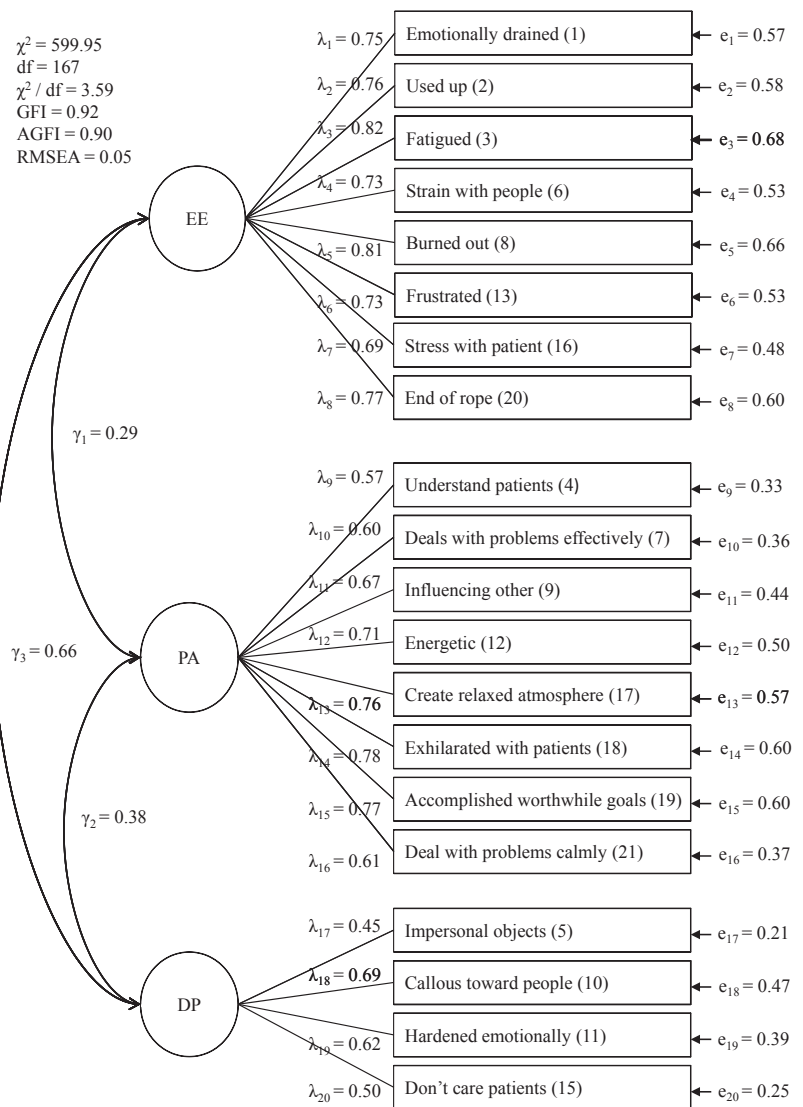
three domains with 20 items. Our study found that MBI-HSS represents a suitable instrument for measuring burnout among nurses in Taiwan after deleting item 14, 'I feel I'm working too hard on my job' and item 22, 'I feel patients blame me for some of their problems'.

Poghosyan *et al.* (2009) explored the factor structure of the MBI-HSS using secondary analysis from eight countries including the United States, Canada, United Kingdom, Germany, New Zealand, Japan, Russia and Armenia. Because the theoretical model established by Maslach were not applicable universally to populations, it was necessary to modify the model for individual countries. For instance, item 22, 'I feel patients blame me for some of their problems' displayed a low factor loading in the majority of these studies. Accordingly, these findings suggest that the MBI-HSS model could be used to measure nurse burnout in different countries if the factor structure was modified. The findings from our study generated a factorial structure that was identical to those described in the literature (Tang 1998, Gil-Monte 2005, Kanste *et al.* 2006, Vanheule *et al.* 2007, Poghosyan *et al.* 2009).

In the current study, the factor loading of item 22 was < 0.4. This result was similar to those in previous studies (Kanste *et al.* 2006, Poghosyan *et al.* 2009). For example, Kanste *et al.* (2006) investigated the factor

structure of MBI-HSS among Finnish nurses. In this study, the factor loading of item 22 was < 0.4, even though the factor loading was double-loaded on two different factors. In addition, Poghosyan *et al.* (2009) also reported that the factor loading of item 22 was < 0.4 in five countries including Canada, United Kingdom, Germany, Russia and Armenia. This effect was ascribed differences associated with semantic equivalence to the item in English-speaking and non-English-speaking countries (Bradley 1996, Worley *et al.* 2008) as well as other characteristics, such as age, gender and working professionals (Tang 1998, Beckstead 2002, Worley *et al.* 2008).

Item 14 defined as 'I feel I'm working too hard on my job' loaded on emotional exhaustion < 0.4, and this item was also deleted by Tang (1998). Tang (1998) assessed the factorial validity of the MBI-HSS among human service professionals in China. In this study, the reason for the deletion of this item was ascribed to the unique way that Chinese define their sense of achievement in work. While the definition of 'hard-working' infers putting a lot of effort into a job and doing it well, the concept of hard working may be different among nurses from Eastern or Western countries. In Western culture, nurses have more confidence and show greater autonomy in patient care when compared with nurses

**Figure 1**

Structure of the MBI-HSS Chinese version. EE, emotional exhaustion; PA, personal accomplishment; DP, depersonalization. γ , correlation coefficient; λ , regression coefficient; e, error terms.

from Eastern countries. 'Hard-working' is a value and an image that is important to Eastern nurses (Huang 2005). While working too hard can result in emotional exhaustion in Western culture, 'hard-working' is a responsibility that can also bring personal accomplishment in Eastern culture. Another possible explanation for the loading of item 14 may be the accuracy of translations and their conceptual equivalence (Bradley 1996, Poghosyan *et al.* 2009).

The goodness-of-fit test was used to verify the modified structure of the MBI-HSS Chinese version based on the exploratory factor analysis results from our study. We found that the results were similar to those of other researchers (Tang 1998, Gil-Monte 2005, Kanste *et al.* 2006, Vanheule *et al.* 2007, Poghosyan *et al.* 2009). For instance, the chi-square analysis was significantly similar to other studies (Beckstead 2002, Gil-Monte 2005, Kanste *et al.* 2006, Vanheule *et al.* 2007, Poghosyan *et al.* 2009). Furthermore, the ratio of the

chi-square value to its degrees of freedom was 3.59, and a ratio < 3.84 , the critical value of chi-square test with degrees of freedom equal to 1, is an indication of a good fit between the model and the data (Hair *et al.* 2006, p. 757). Other CFA criteria also confirmed data fit utilizing the MBI-HSS Chinese version, such as $GFI \geq 0.90$, $AGFI \geq 0.80$ and $RMSEA \leq 0.08$ (Li 2007, Vanheule *et al.* 2007). Therefore, the internal consistency of the MBI-HSS Chinese version provides additional support for factor structure validity. Finally, the Cronbach's alpha on the total and subscales ranged from 0.65 to 0.91 in the present study, and these values were similar to previous studies, 0.7–0.9 (Tang 1998, Gallagher & Gormley 2009, Lin *et al.* 2009).

Limitations of the study

Three limitations exist in the current study. First, the data were obtained from self-report completed by

nurses. Therefore, the responses of the questionnaire may be affected by their feelings during the short period of time while taking the examination, and may not represent a long-term effect of burnout among nurses. Second, although the assessment of mental health was used to screen cases of psychopathology, data regarding the physical health of the subjects were not present in this study. Future studies may need to incorporate the health status among nurses. Third, the current and predictive validity was not examined in our study indicating that our results may only reflect the current status of burnout among nurses. Furthermore, the nurses' performance in relation to patient outcomes may not be predictive.

Few researchers have investigated burnout among nurses in Taiwan, and the sample sizes were small and limited to one hospital in those studies (Chen & McMurray 2001, Hsieh *et al.* 2004). Data from this current study were based on a national database. Our findings suggest that the MBI-HSS can serve as a valid tool better to understand the current burnout status among nurses in Taiwan. Additionally, a cutoff point system with different levels of burnout (e.g. low, medium and high) may be developed in the future to facilitate clinical applications.

Conclusions

A secondary analysis of a national database of Taiwanese nurses confirmed a three factor structure of the MBI-HSS Chinese version using 20 items. Similar to other cultures, our population retained each of the items based on the theoretical structure.

Implications for nursing management

Evidence suggests that nurses are the most prone to burnout among health care professionals (Abushaikh & Saca-Hazboun 2009). Therefore, burnout represents a critical issue for the health care environment. The findings from our study may be applicable in several ways. First, nurses who experience burnout show decreased effectiveness at work, and can present negative attitudes toward themselves (Maslach & Leiter 1997). Therefore, nursing administrators may use this MBI-HSS instrument to assess degrees of burnout among staff nurses in order to improve the awareness of risk factors related to staff burnout. Preventive interventions may need to be implemented in order to decrease burnout among staff nurses.

Burnout among nurses affects patient safety. Van Bogaert *et al.* (2010) reported that degrees of burnout

could predict job outcomes as well as the quality of care. Therefore, nursing administrators may use the MBI-HSS instrument to explore the relationships between nurse burnout and patient outcomes including patient satisfaction and mortality rate. By understanding the different structures of MBI-HSS, cultural diversity can be recognized for different groups of nurses in order to address the issues of burnout, and health policies can be formulated for different health care systems, thereby creating a better work environment.

Positive team collaboration also affects the safety of patients and team members. Situation monitoring is a key component of team resource management. Therefore, the nursing staff can show more support for their peers by using the MBI-HSS as a tool for understanding their burnout status. Effective interventions can also be developed by a team effort to improve the work environment for staff nurses.

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Ethical approval

This study was received ethical approval from National Cheng Kung University Hospital review board (No. 96E6245).

Conflict of interest

No conflict of interest was declared.

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